

REMARKS

This paper is responsive to the Office Action dated May 26, 2006. Applicant has not amended any of the claims. Claims 1-4 remain pending.

Objections to the Drawings

Submitted herewith are replacement drawing sheets 1-9 for FIGS. 1-17 of the present application. These replacement drawing sheets remove the text from FIGS. 8 and 9 to address the Examiner's concerns. In addition, the replacement drawing sheets replace photographs with schematic drawings in compliance with 37 C.F.R. 1.121(d). No new matter is being introduced by the replacement drawing sheets.

Objections to the Specification

Applicant has amended the paragraph on the last six lines of page 7 and the first three lines of page 8, per the Examiner's suggestion, to remove extraneous characters.

With regard to page 10, last line, the Examiner indicated that "Pr ducing" should be replaced with "Producing." However, page 10, last line, of Applicant's copy of the specification already reads "Producing." Accordingly, no amendment to this section of the specification seems necessary at this time. In any case, Applicant authorizes the Examiner to correct the Patent Office's copy of the specification to change "Pr ducing" to "Producing" if this typographical error is indeed present in the Examiner's copy of the specification.

Claim Rejection Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 1-4 under 35 U.S.C. 103(a) as being unpatentable over Surati et al. (US 6,456,339) in view of Keller et al. (US 6,503,195) and Karuta et al. (US 2003/0043303).

Applicant respectfully traverses the rejection. The applied references fail to disclose or suggest the inventions defined by Applicant's claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

The claimed invention relates to a method for automatically calibrating a multi-projection system with at least two projectors for projecting images onto a projection surface. By means of

this method, the projectors can be aligned with respect to each other such that projecting images of the projectors are exactly mutually superimposed for increasing illumination or are arranged side by side with overlapping areas so that the overall image comprises several projected sub-images. The basic problem with multi-projector systems is described in paragraphs [0001] to [0007] of the present application.

Independent claim 1 recites a method for automatically calibrating a multi-projector system with at least two projectors for projecting images onto a projection surface, a digital camera for picking up the projection surface, and a control unit for controlling the projectors and the camera. According to claim 1, an auto-calibration is performed according to the following steps:

- projecting single-strip patterns of intersecting lines parallel in groups onto the projection surface by each of the projectors, the positions of the line intersection points of the single-strip pattern in the image to be projected being known,
- capturing the projected single-strip patterns by means of the camera,
- filtering the captured single-strip patterns for compensating for background noise, ambient light and/or optical distortions of the single-strip patterns caused by the camera and for detecting the line intersection points of the captured single-strip patterns,
- detecting the largest projection surface possible on the basis of the captured single-strip patterns,
- comparing the positions of the line intersection points within the captured single-strip patterns with the known position of the line intersection points of the single-strip patterns to be projected by the projectors in order to detect correction data for correcting distortions occurring as a consequence of unevennesses of the projection surface,
- calculating warp fields and image warping corresponding to the correction data.

In the Office Action, the Examiner failed to specifically show where in Surati et al. the individual elements of claim 1 are disclosed, particularly the steps listed above.

The Examiner stated that Surati et al. does not explicitly recite "single-strip patterns" nor detecting the largest projection surface possible. However, almost all of the elements and steps of claim 1 relate to the use and processing of the single-strip patterns by means of the projectors and the camera. Accordingly, without a clear indication given by the Examiner as to where in

Surati et al. the individual elements of the invention as defined in claim 1 can be found, Applicant is unable to provide any further response to the rejections raised by the Examiner.

At least one fundamental difference between the current claims and Surati et al. is that in Surati et al., landmarks are arranged at the projection surface (see, e.g., the passage beginning column 10 from line 48). These precise reference landmarks, per Surati et al., have nothing to do with the single-strip patterns used according to the claimed invention. For example, the landmarks in Surati et al. must be attached to the projection surface manually. According to the claimed invention invention, however, the single-strip pattern is projected to the projection surface by the projectors.

Consequently, there are significant differences between the claimed invention and the display system of Surati et al. Moreover, these significant differences lead to the fact that the technique of Surati et al. would not have been combined by a person of ordinary skill in the art with other techniques such as those disclosed in Keller et al. or Karuta et al.

Keller et al. relates to a method and system for real-time structured light depth extraction and endoscopic imaging using real-time structured light depth extraction. This technical field is totally different from, and absolutely unrelated to, auto-calibration of multi projector systems, as recited by the claimed invention. Consequently, Applicant cannot understand the arguments of the Examiner in the Office Action with respect to the relevance of the Keller reference.

The third reference cited by the Examiner, namely Karuta et al., also is not related to the present invention. In Karuta et al., only one projection screen is shown and involved. In contrast thereto, the present invention relates to a multi-projector system. Also, in order to detect the largest possible projection surface, in Karuta et al., parameters of the projector are required for the corresponding calculation of the projection surface. This is totally different from the claimed invention, in which the parameters of the multiple projectors are not necessarily required. Therefore, the teaching of Karuta et al. would not have provided any suggestion to a person of ordinary skill in the art that would have led the person to arrive at the claimed invention.

Another deficiency in the Office Action relates to the Examiner taking "Official Notice" that the features of claims 2 and 4 were known. Applicant points out that the Examiner is permitted to take Official Notice of facts outside of the record only when those facts are capable

of "instant and unquestionable demonstrations as being well-known."¹ Applicant respectfully traverse this assertion that the features of claims 2 and 4 were known, particularly in the context of the other features recited in the independent claims. Accordingly, Applicant respectfully requests a document in support of the Examiner's Official Notice, as required by M.P.E.P. 2144.03, in the next Office Action.

In sum, Applicant believes that the rejections of the Examiner are not justified and should be withdrawn while simultaneously confirming patentability of the present invention.

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date:

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By:


Name: Kelly Patrick Fitzgerald
Reg. No.: 46,326

SHUMAKER & SIEFFERT, P.A.
8425 Seasons Parkway, Suite 105
St. Paul, Minnesota 55125
Telephone: 651.735.1100
Facsimile: 651.735.1102

¹ See MPEP 2144.02 quoting In re Ahlert, 424 F.2d 1088, 1092, 165 USPQ 418, 420 (CCPA 1970).